Divine Action, Complexity, and Coherence Theory: A Response to Robert John Russel, Philip Clayton, and Nancey Murphy.

Gregersen, Niels Henrik

Published in:
Theology and Science

Publication date:
2006

Document version
Publisher's PDF, also known as Version of record

Theology and Science, Vol. 4, No. 3, 2006

Divine Action, Compatibilism, and Coherence Theory: A Response to Russell, Clayton, and Murphy

NIELS HENRIK GREGERSEN

It is one of the treats of the J. K. Russell lectureship to receive such generous and challenging responses as those offered by Nancey Murphy, Philip Clayton and Robert John Russell. Their writings, and numerous conversations with each of them, have influenced my own work significantly. Now they push me to clarify my place on the map of the current dialogue between theology and the sciences, especially as relating to leading research programs developed under the aegis of The Center for Theology and the Natural Sciences (CTNS). Murphy focuses on my methodology, Clayton on biology and theology, and Russell on the relation between physics and complexity studies for understanding divine action.

My response will begin in the reverse order, thus moving from physics and biology to methodology. By focusing on the subject matter of divine action and compatibilism(s), I hope to be able to answer also the important methodological questions raised to me by Murphy and Clayton.

Ontological versus nomological compatibilism

Robert John Russell, during the last twenty years, has been for me a spiritual companion and intellectual partner of first rate. He now poses questions to me in print that we have discussed in conversations for quite some years. Does the shift from the mechanical worldview of classical physics to the network view arising out of complexity studies after all matter for the problematic of divine action? It is Russell's suspicion that since computational theory is not a theory of fundamental physics, complexity theory may not be of central relevance for conceptualizing a theological view of divine action in the physical world. According to Russell, quantum mechanics, and only quantum mechanics, provides a possible locus for an incompatibilist divine action, that is, a divine action that transcends the determinist physical processes known from classical physics.

On this background Russell challenges me to choose between one or two options: either follow Arthur Peacocke's compatibilist solution (according to which ''God's activity is merely being manifested in or perhaps as nature''), or Ian Barbour's incompatibilist view of divine action (according to which nature

ISSN 1474-6700 print/ISSN 1474-6719 online/06/030215-14

DOI: 10.1080/14746700600952969
Routledge
Taylor & Francis Group

exhibits ''a fundamental indeterminacy, in which God can work beyond, even sustaining and working through, the deterministic processes of nature'').[1]

In order to answer this question properly, I find it necessary to make a distinction between *ontological* and *nomological compatibilism*. I actually affirm an ontological compatibilism concerning the relation between individual *divine actions and natural events*. That is, there is no natural event, which is not immediately created by God. Since divine creation is not a remote control affair, divine actions in the world of creation (*opera Dei ad extra*) necessarily coincide with natural events. The alternatives to this view are either the view that we live in a two-stock world of creation with separate spiritual and natural domains, or a two-principles doctrine, according to which God is only one factor in the universe alongside an eternal principle of material energy, which is not created by God. However, if God is the creator of all-that-is, and all creatures are materially based, how else and where else could God be creative than in and through natural events and processes? All God's actions are thus both immediate from the point of view of divine agency, but mediated by virtue of the simple that no divine action can take place outside of the natural nexus. Natural events always equal divine-activity-in-and-through-nature. My basic position is here indeed similar to Arthur Peacocke's, and in my view, Peacocke's position reflects a classic Christian commitment, reformulated under the ''naturalist'' assumption that the world is one, and not two.[2]

At the same time, however, I would subscribe to *a nomological incompatibilism concerning the relation between divine action and scientific descriptions of nature's law-like behavior*. That is, the laws of nature, even the deterministic ones, do not have the ontological status of necessitating specific outcomes that God would have either to conform to, or to violate. Divine actions may sometimes be describable as being fully understandable (thus ''compatible'') with scientifically well-known patterns of regularity, but may at other times transcend what can be described through our known scientific laws of nature. Divine action/natural events may thus be *weakly incompatible* with scientific descriptions of law-like behavior, in so far as quite many events fall outside of the domain of scientific predictions (such as the election of Schwarznegger as governor of California), while other events are unforeseeable, either for practical reasons or in principle, from the point of scientific laws (such as the future of *homo sapiens*). A divine action/natural event would similarly be *strongly incompatible* with scientific laws, if these laws did not a priori permit the very possibility of its occurrence.

I admit that this view of the laws of nature is itself motivated by philosophical and theological concerns. Thus, I do not assume that the web of natural events and processes make up one undivided tapestry that can be treated as one causally closed universe *a la modo* Spinoza or Einstein. Rather, on the premises of evolutionary thinking, and on the basis of plurality of existing sciences (each with their separate domains or aspects of explanation), I do not endorse a synthetic naturalism, which pretends that nature is made up of one piece with a unified structure that can be explained either from a particular branch of science (earlier physics, nowadays often evolutionary theory), or from a synthesis of all sciences.

The strongest scientific research programs are working piecemeal, either domain-specific (in touch with specific empirical phenomena) or aspect-specific (such as fundamental theoretical physics). The hope for a unification of all sciences has been dead since the 1940's, but high claims of having ''explained consciousness'' (Daniel Dennett) or having ''explained religion'' (Pascal Boyer) are still with us, though they are less than convincing. By contrast I am committed to the (more genuine, I think) evolutionary view that fundamental physics has paved the way for the evolution of distinctness, so that the end-result is a pluralist universe. Ontological pluralism is probably the deeper reason behind the fact of explanatory pluralism.

Though I am not a process philosopher myself, I share the pluralist intuitions of Whitehead, and I am here probably closer to Ian Barbour's position than to more holistic interpretations of nature that treat nature as being ''of one piece.''[3] As I am going to argue below: Even if the deterministic models of classical physics provided an exact (1:1) description of a deterministic universe, physical processes have in fact given rise to an indeterministic universe with many local processes, such as those of biological systems, that no longer behave in accordance with the explanatory expectations of classical physics. Thus, the complexification of nature *does* matter, also for conceptualizing a sustainable view of divine action. I thus propose a new emphasis on what has traditionally been called ''special divine actions.'' It seems to me that many cases of special divine are to be seen as *weakly incompatible* with scientific laws, including for example incarnation and resurrection, rather than as strongly incompatibilist ''miracles.''

From anthropological to theological compatibilism

The compatibilism-incompatibilism divide needs some further specification. The very terminology derives from the century-long discussions of the relation between human free will and determinism. Compatibilism is here the view that the human will can be said to be free, even in a pre-determined universe, in so far as human agents freely or unencumbered do what they want to do. This argument can be traced back at least to Augustine (354–430) who, in his later anti-Pelagian writings, claimed that the human will is phenomelogically free in so far as the will is not coerced by outside forces. Willing means wanting something, and a will can therefore, by definition, not be forced. Nonetheless, according to Augustine, the eventual choices of the human will (at least in existential matters) follow by necessity in so far as persons act in accordance with their own deepest predispositions and desires. In short, human persons act *non coacte, sed necessario*. In post-Reformation thought, thinkers such as Thomas Hobbes (1588–1679) and David Hume (1711–1776) generalized this compatibilist model of the relation between human freedom and divine predestination into a compatibilist theory about human freedom and a universe ruled by deterministic laws of nature. In both cases, compatibilists claim that there exists no conflict between having a free will and being in a situation, in which one only can wish to do one thing.

Compatibilism is therefore also called 'soft determinism' in contrast to a 'hard determinism' that simply eliminates human freedom.

The alternative incompatibilism then argues that compatibilism (by virtue of the so-called Consequence Argument) is not a viable solution for the following reasons:

(1) Provided that no final agent has power over the past and the laws of physics, and
(2) Provided that the laws of physics are deterministic so that only one future is possible,
(3) It follows that no final agent has power to make other choices than he or she actually does.

The incompatibilist thus argues that if the premises (1) and (2) are correct, there cannot exist a human freedom to pursue different ends under the same circumstances. The counter-argument by Hume and followers was then to make the counterfactual statement that *if* a human were placed in another situation, he or she might have other desires and might make other choices, though they would still come down to the one solution compatible with the determining context of physical laws. This discussion between compatibilists and incompatibilists still goes on vehemently in current philosophy.[4]

Note, however, that the picture changes significantly if we discuss theological compatibilism rather than anthropological compatibilism. Regarding premise (1) two things differ markedly: Being the creator (or the first principle) of the universe, divine agency does neither work under the confines of externally pre-set initial conditions, nor under externally imposed laws of nature.[5] Rather, the laws of nature themselves express God's creative action. Since it is hard to imagine a principled conflict between what God freely wills and what God freely does, one should be aware that a theological compatibism is more commonsensical than the corresponding anthropological compatibilism. Regarding premise (2), a similar change of problematic occurs. From a theological perspective, the laws of physics (even if they were eventually deterministic) do not have status of unalterable laws, since God is their creator and not their victim.

Defusing the NIODA-IODA divide?

These points would, I take, be fully granted by Russell. But how then conceptualize God's transformative actions in evolution? In his response to me, Russell operates with three basic types of divine action: (1) *non-interventionist* and incompatibilist *special divine action* (at the level of quantum processes), (2) non-interventionist and *compatibilist general divine action* (at the level of classical physical processes), and (3) *interventionist and incompatibilist special divine action* (in the case of miracles).

Russell is known to be one of the prime architects of the so-called *NIODA-model* of divine action (Non-Interventionist Objective Divine Action), developed within

the CTNS-Vatican project on divine action. All divine actions are thus mediated by natural agency, and God works without interrupting the normal workings of nature. In his response to me Russell is now declaring himself to be a proponent also of an *IODA-model* (Interventionist Objective Divine Action). Miracles (he mentions Exodus, the healings reported in the New Testament, the incarnation and the resurrection of Jesus) are, according Russell, best described as divine interventions. For miracles, incarnation and resurrection seem to be exceptions from law, neither expressions of nature's ordinary workings nor to be explained away as first-instantiation of new stable laws of nature. Earlier I have only seen Russell argue for an *IODA* concerning the physical resurrection of Jesus.[6] In his response he seems (for the first time?) to take a more principled reservation concerning a thorough *NIODA-model*.

This is probably not the place to discuss miracles in more detail. Let me nonetheless say that I am reticent to accept a concept of ''miracles,'' which is a priori defined negatively as that which flatly conflicts with laws of nature as understood after Newton, Einstein and Bohr. It seems to me, first, to be an anachronism to view all wonders as necessarily *strongly* incompatible with scientific descriptions.[7] If pressed by Russell, I must nonetheless concede that many reported miracles in the New Testament flatly contradict modern as well as ancient worldview assumptions. ''Dead people don't walk.'' However, I do not think that the role of the theologian is necessarily to ''affirm'' miracles simply because they are reported in the Bible. One thing is that a good portion of historical skepticism may be at place. Another thing is that some miracle stories may be seen as teasers that challenge our preconceptions about what is possible and what is not possible. The miracle stories around Jesus are in the New Testament itself understood as ''signs'' (e.g. Mark 13:22; John 2:11), that is, as teasers that facilitate an understanding of Jesus as Christ. Still, did all the reported miracles happen, or not? The honest answer is, I fear, that we do not know, and can never come to know. As for me, I therefore prefer to have my preconceptions teased by miracle stories, rather than having them rationally explained as that which is ''supernatural.'' For the problem with the distinction between what is ''natural'' and what is ''supernatural''[8] is that the supernatural is defined negatively as that which is supposed to happen contrary to natural capacities. My theological counter-position would be that miracles show us what the capacities of nature can be, or potentially could be.[9]

Let me rather discuss the standard distinction between general and special divine action, as used by Russell. Russell's taxonomy has the advantage of being built on different forms of scientific laws. There is thus a high degree of contact between forms of divine actions and forms of scientific laws. This strategy, however, may also have its costs from a theological perspective. First, I do not feel too comfortable with a theological view of ''special divine actions'' that happen so to speak on the top of God's ''general divine activity'' in the ordinary workings of nature. I fear this is a too anthropomorphic picture of God and divine agency. The distinction between general and special divine action is modeled on finite agents who are doing something routinely (like driving a car), while doing other things with particular efforts and attention (like suddenly putting on the brakes and

making a special maneuver). I believe there is an alternative, which is to defuse the standard distinction between special and general divine.

In the 2003 Capstone CTNS-Vatican Conference on divine action, I argued that divine activity should be seen as series of special divine actions (SDAs). Accordingly, the notion of general divine action (GDA) should not be taken as a default position in the dialogue between theology and science, that is, as a view that both liberals and conservatives could agree on. In my view, the term ''general divine action'' does not refer properly to a specific category of divine actions, but is shorthand for the analytical purpose of referring to recurring patterns of God's actions with and in the world of nature. In short, *the concept of special divine action should be given ontological priority over against the concept of general divine action*. The ordinary workings of nature are the net results of myriads of individual events that are each individually created and sustained by God's creativity.[10]

I have here in fact been immensely inspired by the *NIODA* quantum proposal as developed particularly by Russell and Murphy, George Ellis and Thomas Tracy. It seems to me that the quantum proposal exemplifies the distinction between ontological and nomological compatibilism. Thus, the quantum proposal can be reformulated as a locus for incompatibilist divine action with respect to *laws*, though the proposal at the same time can be said to favor a compatibilist view of the relation between divine actions and quantum *events*. For on the interpretation of Russell and colleagues, it is divine agency and not chance, which is finally deciding the individual quantum outcomes.

What I find especially attractive about the quantum proposal is exactly its possibility for reemphasizing God's operational presence in the most basic processes of nature known to us. Any spatial distinction between God and nature evaporates, for as expressed by Russell elsewhere, ''what we normally take as 'nature' is in reality the activity of 'God + nature'''; accordingly, ''we do not know what the world would be like *without* God's action.''[11] The question then is how to cash out this view of divine action in relation to quantum theory. It seems to me that the theological insight is best articulated when God is conceived to be at work in determining the collapse of the wave function pervasively rather than on an ad-hoc basis. I here agree with Murphy's votum: ''both doctrine and logic suggest that if God acts at all, God is acting in everything that happens.''[12]

Now Robert John Russell and Thomas Tracy hypothesize that God may choose to perform a special divine action or refrain from such action, and just let things pass in their ordinary workings. The reason for this move is probably the scientific concern of not violating the over-all probability distribution. On this issue, however, one can argue that a probabilistic law cannot really be violated within a finite time scale.[13] Nonetheless, any scientific theory of a certain probability rate will become more and more implausible, if, say, a dice continues to give '6' more than 100 times in a row. One would begin to wonder whether the dice is strongly loaded. My theological proposal would here be that the actual outcomes of quantum events are 'ontologically' never 'purely' statistical, since there exists no nature *solo*, without God (Russell's own point). Thus understood, *divine action coincides with the actual outcomes in the actual universe that we inhabit*. The outcomes would only be plainly random ('ontological indeterminist' in an ultimate sense),

if not God were not operationally present in the quantum world. On the view defended here, quantum systems are only 'ontological indeterminist' in a penultimate sense. The point of the particularist version of quantum SDA could then be redeemed by stating that God's selection of quantum events does not always have the form of a unilateral control (as in classic-style theological determinism). Divine SDAs have a variety of forms, and our probabilistic laws reflect the world God has chosen to create, the actual world. The only reason for making a distinction between special and general divine action is that God may act differently in different events (and thus may appear to be determinative in some situations, flexible in other). However, we can never disentangle what is divine and what is natural in an event, because they are one.

On this view, there is *no causal joint* in terms of a third neutral meeting ground, nor any possibility of tracking the route from God to world.[14] Rather, the causal joint can only be the very creatures themselves: a nature gifted and burdened by God's giving existence and operational power.

Special divine action and determinism

I am well aware that it is not immediately relevant for a scientific approach to reality to give special divine action ontological priority. Science comes into being by bracketing metaphysical, axiological and theological questions. The majestic task of the physical sciences remains to provide formal mathematical models for explaining universal aspects of nature. I believe, however, that a singularist view of divine action is of central importance for the science-religion dialogue, insofar as it relates to a live debate within the philosophy of science concerning the status of the laws of nature. The singularist view thus provides theological motivation for *not* treating physical laws of nature (be they deterministic, or not) as ontologically ultimate and prescriptive.

Theology should here not simply retreat to dogmatic statements. Rather, theology should concern itself with the current philosophical debate concerning the status of our so-called ''laws of nature.'' Only by entering into a clear coherence relations with non-theological truth-candidates, can a theological position be epistemologically warranted. Concerning the laws of nature, one must first make a distinction between scientific descriptions of the laws of nature, and the putative ''laws of nature'' themselves. Next, one must clarify whether such ''laws of nature'' should be treated as having a Platonic status, existing independent of and prior to their material manifestations, or whether the idea of ''laws of nature'' should be seen as real-word regularities, which (under some conditions) are so persistent, that it is appropriate to dub them, in an Aristotelian vein, ''laws of nature.'' I here agree with Bill Stoeger that scientific laws are to be seen as ''approximate description which reflect the underlying regularities and constraints in the physical, chemical and biological world, but not the independently existing enforcers of that behavior.''[15]

I hereby endorse a regularity view of the laws of nature that serves as a reminder that the laws of physics, even when they are deterministic in their

mathematical form, do not offer an exhaustive picture of the real-world regularities-and-irregularities, nor are prescriptive in the sense that a specific event must necessarily occur, even where they mostly do. For example, a Newtonian description of the collision of billiard balls is certainly quite precise, but it cannot take into account the particular conditions, such as, for example, wind and humidity, the worn nap and uneven corners of the billiard table, not to mention the competence of the billiard players, and their flickering mindstates. Scientific laws of nature take place under a *ceteris paribus* clause, that is, the condition of ''all other things being equal''—what they seldom are. I fully agree that the ''unreasonable effectiveness'' of applied mathematics suggests to us that one must assume some nice anchorage of mathematical models in real-world law-like behavior.[16] It is not advisable to be a postmodernist constructionist in terms of scientific knowledge. However, neither is there a compelling reason to take a rationalistic worldview, according to which all things are always the same. ''If you've seen one electron, you've seen all of them,'' Richard Feynman once rightly said. However, if you have seen one virus, you have not seen all of them, and if you have seen one billiard player, you have not seen all of them. Empirical reality is much more rugged and uneven than mathematical equations seem to suggest.

Now I can almost immediately hear Bob the physicist respond, ''You're right, Niels, at least from a practical perspective, but also remember that the boundary conditions of the billiard balls could be described from the perspective of classical physics, and they also happen to be nicely deterministic.'' ''Yes,'' I would respond, ''but a purely mechanical description is not able, even in principle, to single out the *relevant* boundary conditions for a particular prediction, say, the breadth of the individual billiard player, their competitive or playful interactions, and the ever-changing brain states of the players, and so on.'' I can also imagine Bob, the committed science-and-religion scholar say to me,

> Well, Niels, I am also a Christian, so I agree that many things could happen that transcend our scientific models; at a personal level I am even prepared to concede that God, in a particular situation, might help you to be a better billiard player than you actually are. But see, I'm committed to perform a dialogue between theology and the sciences, where I take scientific models utmost seriously, as seriously as I in personal life try to take my Christian faith. It seems to me, Niels, that by taking a purely descriptive view of scientific laws, you're making your theological case a little too easy. I'm trying to play the game of science and religion following the rules. I'm even assuming a worst-case scenario, in which the deterministic laws of classical physics are simply correct (within the limits provided by quantum theory, which happens to be a more fundamental model). It seems to me, that you, by comparison, risk the danger of playing tennis while lowering the net, when it's your turn.

This is forceful critique, and I am ready to follow Russell's standard of playing the game on an equal basis. My response, however, is two-fold. I would like first to reiterate the aforementioned point that a theologian entering the dialogue between religion and science, should indeed also enter the game of establishing

coherence relations, so as to achieve, wherever possible, a ''cognitive equilibrium'' (to use Philip Clayton's term). And theologians should also be prepared to face the cases, where there may actually be conflicts between science and theology (for example, concerning the far-future of the universe, or the possibility of altruism in social evolution). Such conflict may lead theology to serious revisions. However, I do not accept the presupposition that physics is the prevalent player in the game, or that physics is the final arbiter when it comes to discuss the complex world of evolutionary world. I wish to take the existing sciences seriously by evaluating—in discussion with self-reflective proponents of disciplines—where the different scientific disciplines have explanatory competence, and where they do not. The reason why I take the patchwork view of scientific explanations seriously, is that monocausal models are often not capable of delivering the explanations they claim to explain. There exits, as a matter of fact, no sustained molecular explanation of evolution. Explanatory pluralism is not only a fact of life: it is also, a fact of the empirical sciences, as Nancy Cartwright has reminded us.

To put it in terms of tennis: Being a habitual player myself, I am painfully aware of the mechanics of the game. It is—seen from one perspective—all about hitting the ball the right mechanical way with your racket under the boundary conditions of wind and weather (which makes Newtonian physics relevant); but it is also about apportioning your energy (which makes thermodynamics relevant); and about knowing when to hit hard and when to hit soft (which makes some computational experience relevant). However, it is also a rule-governed game, where the rules are defined socially in terms of the *meaning* of nets, lines, the position of the server, and when to apply this or that line (which makes a social analysis relevant); finally, it is about your own twenty years of practice, and not least about your motivation. Tennis, indeed, is a game with many parameters that cannot be written into one formula. However, for sure I know that the match in front of me cannot easily be computed.

I thus believe that Russell overestimates the importance of physical determinism for evolutionary processes, and that quantum mechanics is not the only source of evolutionary novelty. Let us assume that the underlying laws of nature in our medium-size world are best described in terms of deterministic causal models, such as Newtonian gravity, Maxwell's electromagnetism and Boltzmann's thermodynamics. From a philosophical perspective, the explanatory success of deterministic equations does not imply that the real physical world is therefore simply deterministic. There is no reason for being an uncritical realist concerning laws of nature (be they deterministic or not). Also seen from an evolutionary perspective, there is no warrant for believing that the laws of physics explain the particular features of living beings, not to mention conscious beings. Even if the deterministic laws of physics and chemistry were to have ruled our universe *exactly* as they our equations predict (granting a naïve realism *ex hypothesi*) and even if these laws on their operations may have paved the way for the emergence of living systems (around 4 billion years ago), the causal schemes of physics, be they quantum theoretical or classical, would not able to explain features of biological life, *once life came into being*. Physics and chemistry may determine what is evolutionarily possible and what is not, and may explain the route from

anorganic to organic chemistry, but are incapacitated when it comes to explain the novel features of particular living systems, or the general course of evolution. Almost all theoretical biologists would agree on this point. The lesson to be learnt for philosophers and theologians is, I think, to accept explanatory scientific pluralism in the dialogue of science and theology. In this picture, the determinism implied by classical physics does hardly pose really hard problems for a strong notion of special divine action.[17]

Is coherence enough?

Space does not permit me to respond appropriately to the responses by Nancey Murphy and Philip Clayton. Each in their way ask me whether it is enough for theology to re-describe scientific theories. How can a contextual coherence theory secure that I am not—on the one hand—cherry-picking theologically comforting biological theories (Clayton), and—on the other hand—have a real feedback effect on the sciences involved in the dialogue (Murphy). Murphy and Clayton have the best conceivable background for asking me these questions. Murphy has laid out an impressive program for theology as an empirical research program in her landmark book *Theology in an Age of Scientific Reasoning* (Cornell University Press, 1990) and Philip Clayton has in *Explanation from Physics and Theology* (Yale University Press, 1989), clarified the many meanings of explanation in various research programs, some harder and some softer. I am grateful for their challenging responses.

Clayton rightly points to John Rawls' notion of a ''reflective equilibrium'' as my guiding ideal for the dialogue between theology and the sciences.[18] For indeed, my position concerning ''contextual coherence'' (as learned from Nicholas Rescher)[19] implies that there are two partners in the dialogue, and not just one candidate for truth to which theology should accommodate itself.

Clayton asks me to consider six alternative interpretations of biological interpretation (progressive evolution; convergent evolution; neutral directionality; no progress; Gould's modified neo-Darwinism, Dawkins' sheer chance). He points out that each of these views has different ''implications for theology,'' and he even suggests that on the two last views of evolution, theology is actually ''counter-indicated.'' Clayton has a point here, but the question is whether he is not overstating it. Indeed, there are rival interpretations of evolution. I thus analyzed conflicting biological theories in some detail in my lecture.[20] With Clayton I believe it is important to make explicit thought experiments: *If* you have (scientific interpretation 1,2,3 . . .), and *if* you have (a given hard core theological assumption, *which* (theological options 1,2,3, . . .) would establish a cognitive equilibrium? Though my own role in the dialogue is that of a systematic theologian, this can hardly be seen as a ''faith first''-approach. Clayton's notion of specific ''implications'' from science to theology seems to me too simplistic. Most scientific theories are laden with metaphysical assumptions, which need to be brought to light and scrutinized from a philosophical perspective. (The question of the status of laws in physics is one example). Likewise, a considerable degree of

theological redescription is needed in order to establish a theological truth candidate, on the basis of which the machinery of contextual coherence can be set in motion. I here see it as a problem for the dialogue between theology and the sciences that the theology partner is either not *theoriefähig* (but only refers to examples of religious first-order practice), or so general that its theological content is lacking specificity.

Counter-indications are indeed possible, but usually the problem is that the coherence relations are so general that they become weak; in this case, there would no longer be an *epistemic warrant* for a specific theological redescription. In the case of Gould, the epistemic warrant for a theology of evolution would be weak in terms of evolutionary progress, but rich in terms of exemplifying a principle of plenitude. In the case of Dawkins, there would be a counter-indication, but one built into his metaphysical assumptions of his theory of the ''selfish gene.'' As long as the theological truth candidate is clearly formulated, I cannot see how the evaluation of weaker and stronger relations of coherence can be like the dressing and redressing of an endless series of manikins. The theological manikin, to stay with the metaphor, is quite specific (if a content-rich theology is developed) and she cannot wear all sorts of garment.

I am more intrigued about another issue, where I think that Clayton and I have different ideals of rationality, even though we, on material issues, are often so close. For me rationality is very much about being clear about the domains of the explanatory power of theories or viewpoints. This goes for science and theology as well as for ordinary life situations. I am therefore more skeptical than he is about grand metaphysical schemes (terms such as ''laws of nature'' ''theism'' or even ''panentheism''). I always want to inquire, ''which laws, what status,'' ''which sort of God do you have in mind here,'' ''which version of panenthism do you finally endorse?'' In other words, I take metaphysical concepts not as ends, in which one can live and breathe comfortably, but rather as placeholders or means for developing more content-rich concepts and theories. Metaphysical concepts are always in need of re-specification (what can be learnt from the German social philosopher Niklas Luhmann). Clayton, on his side, feels that I am thinking too much from the inside out, potentially parochially, and too much thinking in epistemic patchworks, rather than daring to trace the big lines. We have discussed this matter in conversations, and I think that we agree about our disagreements of epistemic values. We also agree that one needs to be able to go both inside out as well as outside in, and that our age demands of theologians to be capable of thinking comparatively. The difference is on our primary *loci*.

Nancey Murphy, in her generous response, puts me in front of a very complex task, namely to relate my work to Robert John Russell's encompassing chart of the possible *mutual interactions* between theology and the sciences. Before that she interprets my own interpretation of self-organization and evolution not only correctly, but also in agreement that such interpretative works needs to be done. By redescribing, in theological terms, the world of nature as already described and (partially) explained by the sciences, the sciences are used as pivotal resources for an enriched theology.

But here the lines obviously go from the sciences to theology. Now she asks me whether the line could go the other way: theology impacting sciences. She classifies my work as mostly within Russell's fifth path, which is that a scientific network of theories ''function heuristically in theology by providing conceptual and other sorts of inspiration.''[21] Her question is now whether theology may not also review the philosophical assumptions that may be embedded in the sciences. ''Might it be the case that theologians are sometimes in a better position to recognize metaphysical assumptions in science than the scientists themselves.'' This can obviously be the case. One outstanding example is the interpretation of the competition versus cooperation in evolutionary theory. One wonders whether the decade-long discussions on altruism in evolution would have taken place, if we were not living in a religious and humanistic culture in which altruism and generosity is given such emphasis. Theologians also often are better trained in the history of ideas than the scientists themselves, and thus may contribute to understanding why one theory, in a given situation, is given prevalence over another. Why could Niels Bohr live comfortably with paradoxes, while Max Born opted for a determinist interpretation of quantum theory? Such tasks, however, are not a theological prerogative, but are philosophical or historical in nature, and should best be performed in collaboration with specialized philosophers and historians of science.

Murphy also asks the question how I could place myself in relation to Russell's paths 1-4, that put even stronger emphasis on the impact from the sciences to theology.[22]

- *Path 1.* Can scientific theories *act directly as data* for theology so that a theology is constrained by a scientific theory? Yes, one example is the pivotal role of natural selection in evolution that certainly puts constraints on theology. No theology of creation can avoid picking that grape, sour or not! Similarly, theologies can lose plausibility via incoherent relationships to science, which has happened to Teilhard de Chardin's optimistic theory of an orthogenesis towards perfection. Not picking grapes can also have fatal effects!
- *Path 2*: Can scientific theories act *directly as data for theology that need to be explained by theology or taken as a basis for a constructive theological argument*? Yes, and I believe my own work exemplifies this position as well, both concerning cosmic fine-tuning where theology (as Murphy knows better than most) may function as a causal explanation, or the view of convergent evolution, where a theology of creation at least provides a meaningful picture of evolution that brings the many aspects of convergence into a coherent picture.
- *Path 3*: Can scientific theories, *via philosophical interpretation, act indirectly as data* for theology? Yes, one example discussed above is the importance of an Aristotelian interpretation of laws of nature for nomological incompatibilism.
- Finally *path 4*: Can scientific theories *act indirectly as data for theology when incorporated in a philosophy of nature*? Yes, there are many examples of this, for example Whitehead's philosophy of nature, or in my own reference to a current worldview of networks. However, as I have indicated briefly above, and in some lengths in *Rethinking Theology and Science*,[23] I am in general

skeptical about too general metaphysical worldview assumptions. Generalisations are avoidable, and can be helpful in popularizations. However, grand scale worldviews may lead both scientists and theologians astray in making too general assumptions on a too narrow empirical background.

The hard work of the science-theology dialogue, as I see it, lies at Russell's paths 1, 2, 3, and 5, and I see my work as much in paths 1–3 as in 5. This is what I wrote in my earlier typology of levels of interaction: ''The incorporation of [scientific] data, theories, and thought models [in theology] is in my view the level where the coherence model works best by bringing the interlocutors in science and theology into a rational procedure. There are two other examples of contextual interlinkage, however, of equal importance, though less susceptible to rationalization: the *exchange of metaphors* . . . [and] the *level of worldviews*.''[24]

I am happy to be reminded of this reticence by such an eminent empiricist philosopher as Nancey Murphy.

Endnotes

1 Robert John Russell, ''An Appreciative Response to Niels Henrik Gregersen's JKR Research Conference Lecture,'' *Theology and Science*, vol. 4, no. 2 (2006): 130.
2 See Arthur Peacocke's forthcoming book, *A Theistic Naturalistic Theology for the 21st Century* (Oxford: Oxford University Press, 2006–2007).
3 See Niels Henrik Gregersen, ''Distinkthedens tænker: Alfred North Whitehead,'' in Alfred North Whietehead, *Religionens tilblivelse* (Copenhagen ANIS, 1995), 82–136.
4 An extensive and updated discussion can be found in the entry ''Compatibilism'' at www.plato.stanford.edu/entries/compatibilism (accessed 27 July 2006).
5 Note that this first-principle argument, and hence the principled difference between anthropological and theological compatibilism, will not be conceded by process theologians, since Whitehead (after *Religion in the Making* [New York: The Macmillan Company, 1926]) posits two ultimate principles: God as everlasting ideal and material creativity.
6 Robert John Russell, ''Bodily Resurrection, Eschatology, and Scientific Cosmology,'' in *Resurrection: Theological and Scientific Assessments*, eds. Ted Peters and Robert John Russell (Grand Rapids, Mich.: Eerdmans, 2002), 22.
7 Niels Henrik Gregersen, ''Wunder V: Religionsphilosophisch,'' *Die Religion in Geschichte und Gegenwart* (Tübingen: Mohr-Siebeck, 2004), vol. 8, 1725–1726.
8 A distinction that was rare up to the 13th century, see Graham Ward, ''Supernaturalism,'' in *Encyclopedia of Science and Religion*, ed. J. Wentzel Van Huyssteen (New York: MacMillan Reference, 2003), vol. 2, 846–848.
9 Also I think it inappropriate to categorize the incarnation of the divine Logos in Jesus, or the Pauline account of the resurrection of Jesus into God's own life, as miracles that breaks with laws of nature, but this cannot be discussed here.
10 Niels Henrik Gregersen, ''Special Divine Action and the Quilt of Laws: Why the Distinction between Special and General Divine Cannot be Maintained,'' in *Scientific Perspectives on Divine Action: Fourteen Years of Problems and Progress*, eds. Robert John Russell, Nancey Murphy, and William R. Stoeger, S. J. (forthcoming).
11 Robert John Russell, ''Does the 'God who Acts' Really Act in Nature,'' in *Science & Theology: The New Consonance*, ed. Ted Peters (Boulder, Colo.: Westview Press, 1988), 89.
12 Nancey Murphy, ''Divine Action in the Natural Order: Buridan's Ass and Schrödinger's Cat,'' in *Chaos and Complexity: Scientific Perspectives on Divine Action*, 2nd ed., eds. Robert

John Russell, Nancey Murphy, and Arthur R. Peacocke (Vatican City: Vatican Observatory Publications/Berkeley, Calif.: CTNS, 1997), 330.
13 As suggested by George Ellis in discussions.
14 In process theology, this neutral ground is provided for by the ''eternal objects'' and the ''creativity,'' which is commonly shared between actual entities, whether divine or worldly.
15 William R. Stoeger, S. J., ''Contemporary Physics and the Ontological Status of the Laws of Nature,'' in *Quantum Cosmology and the Laws of Nature: Scientific Perspectives on Divine Action*, eds. Robert J. Russell, Nancey Murphy, and C. J. Isham (Vatican City: Vatican Observatory Publications/Berkeley, Calif.: CTNS, 1993), 211.
16 See Eugene Wigner, ''The Unreasonable Effectiveness of Mathematics in the Science,'' *Communications in Pure and Applied Mathematics*, 13:1 (February 1960). Note, however, that also Wigner makes the following observation: ''Every empirical law has the disquieting quality that one does not know its limitations,'' 8.
17 So also William P. Alston, ''Divine Action, Human Freedom, and the Laws of Nature,'' in *Quantum Cosmology and the Laws of Nature*, eds. Russell, Murphy, Isham, 189, no. 15.
18 Philip Clayton, ''Biology, Directionality, and God: Getting Clear on the Stakes for Religion-Science Discussion,'' *Theology and Science*, vol. 4, no. 2 (2006): 121–127.
19 Niels Henrik Gregersen, ''A Contextual Coherence Theory for the Science-Theology Dialogue,'' in *Rethinking Theology and Science: Six Models for the Current Dialogue*, eds. Niels Henrik Gregersen and J. Wentzel van Huyssteen (Grand Rapids, Mich.: Eerdmans, 1998), 181–232.
20 Niels Henrik Gregersen, ''The Complexification of Nature: Supplementing Neo-Darwinism,'' *Theology and Science*, vol. 4, no. 1 (2006): 7–19.
21 Nancey Murphy, ''Niels Henrik Gregersen's Contribution to Theology-and Science Methodology,'' *Theology and Science*, vol. 4, no. 2 (2006): 117.
22 In what follows I refer to Russell, ''Bodily Resurrection, Eschatology, and Scientific Cosmology,'' 12–13, no. 6.
23 Gregersen, ''A Contextual Coherence Theory,'' 215–226, no. 19.
24 Ibid., 224, no. 19.

Biographical Notes

Niels Henrik Gregersen is professor and chair of systematic theology (dogmatics) at Copenhagen University, Denmark (www.teol.ku.dk/ast). His primary research fields are contemporary constructive theology and science-and-religion. His work on the theological perspectives in complexity studies is well-known, and he received from the John Templeton Foundation a significant award for his cutting-edge research in this area. His edited or co-edited works include *Design and Disorder: Perspectives from Science & Theology* (T. & T. Clark, 2002), *From Complexity to Life: On the Emergence of Life and Meaning* (Oxford University Press, 2003), and *The Future of Lutheran Theology* (Fortress, 2004).